Intro

Phase 1: Nuclear Reactor

- Step 1: Get uranium and put in the nuclear reactor
- Step 2: Set up the nuclear reactor
  - Fuel elements, moderator, control rod
- Step 3: Insert uranium in the nuclear reactor in the moderator

Phase 2: Fission

- Step 1: bombard the fuel element with neutron
- Step 2: chain reaction of neutrons breaking off
- Step 3: fission releases heat
- Step 4: surrounding water boils
- Step 5: hot water goes through pipes

Phase 3: Heat exchanger

- Step 1: heat radiating from pipes heat up surrounding water
- Step 2: water turns into steam and goes into turbine

Phase 4: Turbine

- Step 1: Steam goes through turbine blades
- Step 2: blades make the fan spin, which makes generator spin
- Step 3: magnetic field is generated by spinning copper coil around magnets
- Step 4: electricity is sent

Phase 5: What happens to the steam, nuclear waste?

Conclusion

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Nuclear energy is one of the most reliable sources of green energy and although the possibility of nuclear fallout and radiation leaks sound scary, nuclear energy is actually extremely safe. Specially with the regulations and preventions that have been studied and developed over the past few decades. In addition, nuclear waste can be reused to produce more energy or even recycled to make edibles products. With its progress, maybe someday the whole world will be powered with nuclear energy. The possibilities are endless, but first we must learn how it works before thinking of how to use it. Understanding how a nuclear reactor works is not really that complicated; it is chemistry, not rocket science. We will be looking into each phase of the process in detail. There are four phases in total and it all begins with setting up a nuclear plant's core reactor.

Phase 1: The Core Reactor

Phase one of the process is to prepare a nuclear reactor core, which is where the reaction takes place. The reactor core is made up of three crucial parts: the control rods, the moderator, and the fuel elements.[1] Since nuclear reactors generate an intense amounts of energy extremely fast, we need to find ways to slow down the process. For that, we have the control rods and moderator. Control rods are also used to absorb any spare materials. They are constantly changed in order to keep the energy generated in check. The moderator (also known as coolant) is a liquid used as a cooling system and to slow down the process. Usually water is used for this, which is

why nuclear power plants are often placed near a lake or river. In order to keep the temperature in check, there are pumps that constantly refill the reactor core with cool water. Finally, the fuel elements are the materials used to generate power. Commonly, uranium-235 and plutonium-238 are used as fuel elements since both elements are extremely reactive and unstable. In part, this means that they generate the most heat when undergoing fission.[2]

Phase 2: Fission

The second phase is fission, the division of an atom's nucleus. This process is what releases an intense amount of heat.[3] Waiting for a nucleus to split on its own is a natural process that takes years, sometimes decades and even centuries. In order to speed up this process, scientists bombard a neutron of the fuel element until it breaks down.[4] However, heat is not the only thing that is released. The neutrons from the nucleus are shot out at high speeds, hitting other uranium nuclei. This causes a chain reaction that keeps breaking down the fuel element until nothing is left but waste. This may sound dangerous, like poking a sleeping bear with a stick, but scientist have figured out ways to control the reaction. While this happens, the moderator slows down the speed of the neutrons by being on the way. The control rods absorb any spare neutrons so the process doesn't get out of control. Now that heat is being released, the surrounding water begins to heat and boil. The hot water rises and is then taken by a pump into pipes that transport it to the heat exchanger. Now we begin the third phase of the process.

Phase 3: Heat Exchanger

The heat exchanger is a tank of cool water located away from the nuclear core reactor. A set of pipes carrying the boiling water goes into the heat exchanger. Since the water could be radioactive, it is not dumped into the heat exchanger. Instead, the pipes run inside of the heat

exchanger and the radiated heat affects the water around the pipes. As the water inside the heat exchanger heats up, the water in the pipes cool down. The water in the pipes cools down and returns to the core reactor. The water inside the heat exchanger heats up and turns into steam, which goes to the turbine.

Phase 4: Turbine

Finally, the fourth phase is using a steam turbine to generate electricity. A steam turbine is like a fan that uses windflow to generate electricity. The steam rushing through the blades causes the blades to spin. As the blades spin, a shaft made up of copper coil, in the middle of the contraption, begins to spin. Magnets on fixed blades generate a magnetic field that pushes electrons to one direction, which is what generates electricity.[5] This also cools down some of the steam and condencenses it. The steam turns back into water and is reused in the system. The steam that does not cool down is released into nature, which is why nuclear power plants have a huge white cloud coming out of its towers.

As we have seen, a nuclear reactor is not as complicated as it sounds. It all begins in a nuclear core reactor, which is made up of fuel elements, control rods, and a moderator. The fuel element, Uranium-238 or Plutonium-235, is bombarded with neutrons until its nucleus splits. This causes fission, which releases a lot of heat that is harnessed for energy. When this happens, a chain reaction happens, and more fission reactions take place as more neutrons are released. The heat is absorbed by the water, which is transported to a heat exchanger. Water is so hot that it turns into steam, which powers a steam turbine. The turbine generates electricity and it travels for miles until it reaches our homes and other buildings.

Sources:

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